

# Claims

- [c1] 1. An optical system comprising:
- at least one optical element having an optical surface,
  - a correction radiation device including
    - at least one correction radiation source for emitting correction radiation,
    - a scanning device having at least one scanning mirror, the scanning mirror being irradiated by the correction radiation and driven in such a way that a defined portion of the optical surface of the optical element is scanned with the correction radiation, said scanning resulting in a correction of imaging characteristics of the optical element by means of heat supplied to the optical element by the correction radiation.
- [c2] 2. The optical system according to claim 1 comprising a plurality of cooperating correction radiation sources and scanning mirrors associated with the plurality of correction radiation sources.

- [c3] 3. The optical system according to claim 1 comprising a modulator cooperating with the scanning device for modulating the intensity of the correction radiation.
- [c4] 4. The optical system according to claim 1 in which the scanning device is in a signaling connection with a sensor device which monitors the optical system, the scanning device processing signals received from the sensor device for activating the portion to be scanned of the optical element.
- [c5] 5. The optical system according to claim 4 in which the sensor device monitors the imaging characteristics of the optical system.
- [c6] 6. The optical system according to claim 4 in which the sensor device includes a position-sensitive optical sensor.
- [c7] 7. The optical system according to claim 6 in which the position-sensitive optical sensor is a CCD array.
- [c8] 8. The optical system according claim 4 in which the sensor device monitors the temperature of the optical system.
- [c9] 9. The optical system according to claim 8 in which the sensor device includes a thermal imaging camera.

- [c10] 10. The optical system according to claim 1 in which the correction radiation source is a laser.
- [c11] 11. The optical system according to claim 1 in which the correction radiation has an emissions wavelength that can be varied by the correction radiation source.
- [c12] 12. The optical system according to claim 1 in which the correction radiation source has an emission wavelength being greater than 4  $\mu\text{m}$ .
- [c13] 13. Optical system according to claim 1 comprising a plurality of optical elements through which the correction radiation passes, the emission wavelength of the correction radiation and the material selection of the optical elements being such that only the at least one optical element the imaging characteristics of which are to be corrected is supplied with heat by the correction radiation.
- [c14] 14. The optical system according to claim 1 comprising a plurality of optical elements and wherein the correction radiation is so directed that only the at least one optical element the imaging characteristics of which are to be corrected is irradiated by the correction radiation.
- [c15] 15. The optical system according to claim 1 in which the

optical element the imaging characteristics of which are to be corrected has a coating absorptive for the correction radiation.

- [c16] 16. The optical system according to claim 1 comprising a projection light source which illuminates a layer on a substrate that is sensitive to projection light emitted by the projection light source but not sensitive to the correction radiation.
- [c17] 17. The optical system according to claim 1 in which the optical element is a refractive optical element.
- [c18] 18. The optical system according to claim 1 in which the optical element is reflective for projection light emitted by a projection light source.
- [c19] 19. The optical system according to claim 1 which forms a projection exposure apparatus for microlithography.
- [c20] 20. The optical system according to claim 19 having a rotationally asymmetrical illumination.